

We claim:

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1. A monocyclopentadienyl complex comprising the structural feature of the formula  $\text{Cp}-(\text{Z}-\text{A})_m\text{M}^{\text{A}}$  (I), where the variables have the following meanings:

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Cp is a cyclopentadienyl system,

A is an uncharged donor comprising at least one atom of group 15 or 16 of the Periodic Table,

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Z is a bridge between A and Cp comprising at least one atom of group 14 of the Periodic Table and at least one atom of group 15 or 16 of the Periodic Table,

$\text{M}^{\text{A}}$  is titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum or tungsten or an element of group 3 of the Periodic Table and the lanthanides and

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m is 1, 2 or 3.

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2. A monocyclopentadienyl complex as claimed in claim 1 which has the formula  $\text{Cp}-(\text{Z}-\text{A})_m\text{M}^{\text{A}}\text{X}^{1\text{A}}_n$  (V), where the variables have the following meanings:

Cp is a cyclopentadienyl system,

A is an uncharged donor comprising at least one atom of group 15 or 16 of the Periodic Table,

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Z is a bridge between A and Cp comprising at least one atom of group 14 of the Periodic Table and at least one atom of group 15 or 16 of the Periodic Table,

$\text{M}^{\text{A}}$  is titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum or tungsten or an element of group 3 of the Periodic Table and the lanthanides and

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m is 1, 2 or 3,

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5  $X^{1A}$  are each, independently of one another, fluorine, chlorine, bromine, iodine, hydrogen,  $C_1$ - $C_{10}$ -alkyl,  $C_2$ - $C_{10}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl, arylalkyl having 1-10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part,  $NR^{18A}R^{19A}$ ,  $OR^{18A}$ ,  $SR^{18A}$ ,  $SO_3R^{18A}$ ,  $OC(O)R^{18A}$ , CN, SCN,  $\beta$ -diketonate, CO,  $BF_4^-$ ,  $PF_6^-$  or bulky noncoordinating anions or two radicals  $X^{1A}$  may form a substituted or unsubstituted diene ligand, in particular a 1,3-diene ligand, and the radicals  $X^{1A}$  may also be joined to one another,

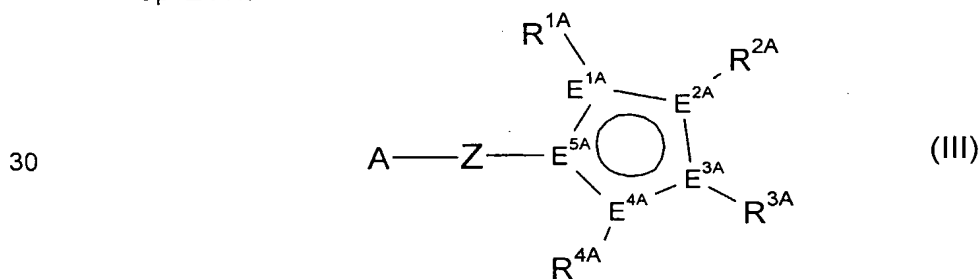
10  $R^{18A}$ - $R^{19A}$  are each, independently of one another, hydrogen,  $C_1$ - $C_{20}$ -alkyl,  $C_2$ - $C_{20}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part,  $SiR^{20A}_3$ , where the organic radicals  $R^{18A}$ - $R^{19A}$  may also be substituted by halogens or nitrogen- and oxygen-containing groups and two radicals  $R^{18A}$ - $R^{19A}$  may also be joined to form a five- or six-membered ring,

15  $R^{20A}$  are each, independently of one another, hydrogen,  $C_1$ - $C_{20}$ -alkyl,  $C_2$ - $C_{20}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals  $R^{20A}$  may also be joined to form a five- or six-membered ring and

20  $n$  is 1, 2 or 3.

3. A monocyclopentadienyl complex as claimed in claim 1 or 2 comprising the structural element of the formula  $Cp-Z-A-M^A$  (II), where the variables have the following meanings:

25  $Cp-Z-A$  is



35 where the variables have the following meanings:

$E^{1A}$ - $E^{5A}$  are each carbon or not more than one  $E^{1A}$  to  $E^{5A}$  is phosphorus,

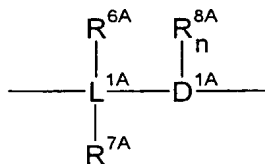
40  $R^{1A}$ - $R^{4A}$  are each, independently of one another, hydrogen,  $C_1$ - $C_{22}$ -alkyl,  $C_2$ - $C_{22}$ -alkenyl,  $C_6$ - $C_{22}$ -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20

carbon atoms in the aryl part,  $\text{NR}^{5\text{A}}_2$ ,  $\text{N}(\text{SiR}^{5\text{A}}_3)_2$ ,  $\text{OR}^{5\text{A}}$ ,  $\text{OSiR}^{5\text{A}}_3$ ,  $\text{SiR}^{5\text{A}}_3$ ,  $\text{BR}^{5\text{A}}_2$ ,

where the organic radicals  $\text{R}^{1\text{A}}\text{-R}^{4\text{A}}$  may also be substituted by halogens and two vicinal radicals  $\text{R}^{1\text{A}}\text{-R}^{4\text{A}}$  may also be joined to form a five-, six- or seven-membered ring, and/or two vicinal radicals  $\text{R}^{1\text{A}}\text{-R}^{4\text{A}}$  are joined to form a five-, six- or seven-membered heterocycle containing at least one atom from the group consisting of N, P, O and S,

the radicals  $\text{R}^{5\text{A}}$  are each, independently of one another, hydrogen,  $\text{C}_1\text{-C}_{20}\text{-alkyl}$ ,  $\text{C}_2\text{-C}_{20}\text{-alkenyl}$ ,  $\text{C}_6\text{-C}_{20}\text{-aryl}$ , arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two geminal radicals  $\text{R}^{5\text{A}}$  may also be joined to form a five- or six-membered ring,

Z is a divalent bridge between A and Cp and is



where

$\text{L}^{1\text{A}}$  is carbon, silicon or germanium, in particular silicon,

$\text{D}^{1\text{A}}$  is an atom of group 15 or 16 of the Periodic Table, in particular oxygen, sulfur, nitrogen or phosphorus,

n is 0 when  $\text{D}^{1\text{A}}$  is an atom of group 16 and is 1 when  $\text{D}^{1\text{A}}$  is an atom of group 15,

$\text{R}^{6\text{A}}\text{-R}^{8\text{A}}$  are each, independently of one another, hydrogen,  $\text{C}_1\text{-C}_{20}\text{-alkyl}$ ,  $\text{C}_2\text{-C}_{20}\text{-alkenyl}$ ,  $\text{C}_6\text{-C}_{20}\text{-aryl}$ , arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $\text{SiR}^{9\text{A}}_3$ , where the organic radicals  $\text{R}^{6\text{A}}\text{-R}^{8\text{A}}$  may also be substituted by halogens and two geminal or vicinal radicals  $\text{R}^{6\text{A}}\text{-R}^{8\text{A}}$  may also be joined to form a five- or six-membered ring and

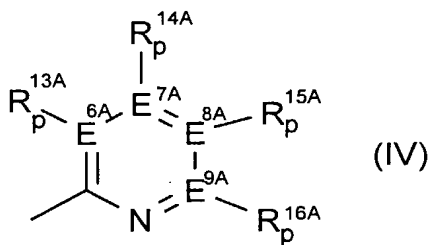
$\text{R}^{9\text{A}}$  are each, independently of one another, hydrogen,  $\text{C}_1\text{-C}_{20}\text{-alkyl}$ ,  $\text{C}_2\text{-C}_{20}\text{-alkenyl}$ ,  $\text{C}_6\text{-C}_{20}\text{-aryl}$  or arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part,  $\text{C}_1\text{-C}_{10}\text{-alkoxy}$  or  $\text{C}_6\text{-C}_{10}\text{-aryloxy}$  and two radicals  $\text{R}^{9\text{A}}$  may also be joined to form a five- or six-membered ring, and

A is an uncharged donor group containing one or more atoms of group 15 and/or 16 of the Periodic Table of the Elements or a carbene, preferably an unsubstituted, substituted or fused, heteroaromatic ring system, and

5  $M^A$  is a metal selected from the group consisting of titanium in the oxidation state 3, vanadium, chromium, molybdenum and tungsten.

4. A monocyclopentadienyl complex as claimed in any of claims 1 to 3, wherein A is a group of the formula (IV):

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, where

$E^{6A}-E^{9A}$  are each, independently of one another, carbon or nitrogen,

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$R^{13A}-R^{16A}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{17A}_3$ , where the organic radicals  $R^{13A}-R^{16A}$  may also be substituted by halogens or nitrogen and further  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{17A}_3$  groups and two vicinal radicals  $R^{13A}-R^{16A}$  or  $R^{13A}$  and Z may also be joined to form a five- or six-membered ring and

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$R^{17A}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl or arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals  $R^{17A}$  may also be joined to form a five- or six-membered ring and

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p is 0 when  $E^{6A}-E^{9A}$  is nitrogen and is 1 when  $E^{6A}-E^{9A}$  is carbon.

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5. A monocyclopentadienyl complex as claimed in claim 3 or 4, wherein -Z- is  $-SiR^{6A}R^{7A}-O-$ .

6. A catalyst system for olefin polymerization comprising

A) at least one monocyclopentadienyl complex as claimed in any of claims 1 to 5,

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- B) optionally, an organic or inorganic support,
- C) optionally, one or more activating compounds,
- 5 D) optionally, further catalysts suitable for olefin polymerization and
- E) optionally, one or more metal compounds containing a metal of group 1, 2 or 13 of the Periodic Table.

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7. A prepolymerized catalyst system comprising a catalyst system as claimed in claim 6 and one or more linear C<sub>2</sub>-C<sub>10</sub>-1-alkenes polymerized onto it in a mass ratio of from 1:0.1 to 1:1000 based on the catalyst system.

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8. The use of a catalyst system as claimed in claim 6 or 7 for the polymerization or copolymerization of olefins.

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9. A process for preparing polyolefins by polymerization or copolymerization of olefins in the presence of a catalyst system as claimed in claim 6 or 7.

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